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Review Article

THE RELATIONSHIP BETWEEN EMOTIONAL REGULATION AND SPORTS PERFORMANCE: A SYSTEMATIC REVIEW

RELAÇÃO ENTRE REGULAÇÃO EMOCIONAL E DESEMPENHO ESPORTIVO: REVISÃO SISTEMÁTICA

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RESUMO
O objetivo do estudo foi investigar, através de uma revisão sistemática da literatura, a relação entre a regulação emocional dos atletas no desempenho ou competição. A estratégia (SPIDER) foi utilizada, e as palavras-chave foram escolhidas de acordo com o vocabulário restrito de cada base de dados (PubMed, SciElo, Portal BVS, SPORTDiscus, PsycNET). Os operadores booleanos AND e OR foram utilizados, 2 critérios de inclusão e 4 de exclusão. Esta revisão sistemática está registrada na plataforma PROSPERO sob o ID CRD42020216250. Para análise e síntese qualitativa, foram incluídos 10 estudos, e foram identificadas 16 modalidades com uma amostra de 434 atletas, sendo 84,1% do sexo masculino e 15,9% do sexo feminino. Em relação aos resultados, observamos a relação entre a regulação e o desempenho esportivo está na interação de fatores ambientais, sociais e psicológicos, podendo desencadear emoções positivas e negativas que impactam o desempenho esportivo. Além disso, os estudos sugerem o fenômeno da regulação das emoções por meio de vários instrumentos e estratégias, demonstrando assim a heterogeneidade dos estudos incluídos nesta revisão. Não foram observados estudos longitudinais; no entanto, as emoções e a regulação das emoções podem sofrer alterações devido ao momento esportivo e ao grau de importância da competição.
Palavras-chave: Regulação Emocional. Desempenho Esportivo. Competição.

ABSTRACT
The aim of the study was to investigate, through a systematic review of the literature, the relationship between athletes' emotional regulation in performance or competition. The strategy (SPIDER) was used, and the keywords were used according to the respective vocabulary restricted to each database (PubMed, SciElo, Portal BVS, SPORTDiscus, PsycNET). The Boolean operators AND and OR were used, and 2 inclusion and 4 exclusion criteria were adopted. This systematic review is registered on the PROSPERO platform under the ID CRD42020216250. For analysis and qualitative synthesis, 10 studies were included, and 16 modalities were identified with a sample of 434 athletes, 84.1% male and 15.9% female. Regarding the results, we can observe that the relationship between regulation and sports performance lies in the interaction of environmental, social, and psychological factors, which can trigger positive and negative emotions that impact sports performance. Moreover, it is worth noting that the studies have verified the phenomenon of regulation of emotions through various instruments and strategies, thus demonstrating the heterogeneity of the studies included in this review. No longitudinal studies were observed; however, emotions and regulation of emotions can undergo alterations due to the sporting moment and the degree of importance of the competition.
Keywords: Emotional Regulation. Sports Performance. Competition.

Introduction

The study of emotions is a diverse field of interdisciplinary studies which intensified with the so-called "emotional twist" in science and humanities since the 1970s [1] .The emotions, defined as psych reactions of particular intensity, act on the motor behaviour and are followed by organic phenomena, especially of neuro-vegetative nature [2].Hey can therefore significantly

influence the degree of effort to be made and, consequently, on the result of the performances [3]. Emotions can stimulate the athlete and mobilize them to apply the maximum of their strength or reduce their potential or make them indifferent and without energy [4]. Due to these reasons, it is necessary to take into account the significance and effectiveness of emotions both in the process of training and in training and competitions and use them correctly [5].

Emotions arise from the subject's perceptions and evaluations that allow them to link environmental events with the satisfaction or limitation of their needs or motivations [6]. As can be seen, thought is very important in triggering emotional reactions. Currently, the role of cognition in emotions is recognized [7], even when authors [8], signal different areas of influence beyond the cognitive. For example, the sensations of fear or safety when an athlete is doing an exercise are always related to their judgment of the situation; they are dependent on their physical and psychological condition and physical possibilities, techniques, and tactics, including the perception of the level of difficulty of the task [5].

It is essential to mention that emotions must not be seen as isolated but linked as closely as possible to the whole personality and influenced by all processes and qualities. Considering the intentionality of emotions as evaluative representations of objects that motivate the participant possessing the feeling to act following the emotional evaluation [9].

Emotions take on a behavioral "steering function". All emotion has at least five aspects that could be analysed. The first is the personal emotional experience: the one characteristic of the emotion that a person consciously feels, knows, and can describe verbally. The second aspect is the physiological or body changes that happen in the moment of the emotion and follows it during its path, as blood pressure, cardiac frequency, or respiration alter their typical values. The third aspect relates to the cognitive processes in which emotional reactions change. And finally, the fifth aspect is motivation since an excited organism is an organism oriented toward an end [10].

The central theme is that emotion has the category of motivation as one of its attributes. Everyone excited will act actively towards development or outcome that will finish with the emotional status. So all the complexity of our behaviour will be regulated by emotion. We could affirm that we are emotions if it were not for the fact that by itself, we are linked to cognitive processes and, by them, the means to regulate its manifestation [11].There is, however, an intrinsic relation between the quality and intensity of the emotion experienced with the act, that is, between the different types of emotions (joy, anger, etc.), and the intensity of the experience of these emotions [12].

Emotions in sports are one of the more productive themes in the literature in this field. In recent studies, the basic methodological and conceptual questions related to the definition, classification, and assessment of emotions occupy an area of interest in the theoretical models that link emotions to performance [13].

In general, it seems to have a consensus that emotions could influence the athlete's physical, motivational and cognitive performance since the competitive sport demands a tremendous physical and emotional demand from the athletes, which will impact the performance level[14]. Once the emotional reactions occur, they begin to mediate the particularities of the athlete's personality and, at the same time to be mediated by them in real interaction. In this way, emotions play a significant role in activation, organization, orientation, and control. Consequently, they are one of the most critical aspects of sports practice, as they can influence the athlete's performance positively or negatively [15, 16, 17].

According to some authors [13, 15, 16, 17],once there is an essential and present influence of emotions on the performance, this requests from the athlete a robust and efficient regulation to

deal with the variation of positive/agreeable and negative/disagreeable emotions experienced [18]. The ability to regulate emotions lies in creating psychological and coping mechanisms that support the subject in dealing with their feelings [18]. emotional regulation consists of the ability to diminish, maintain or increase emotions in circumstances that ask for this ability [6].

A review [13], mentioned the importance of emotional regulation through time in the sports context and its implication in athletes' motor, physiological, and psychological performance. The present study is proposed as an alternative to the relationship between the athlete's emotional regulation in sport competition. In this sense, a systematic literature review was employed involving aspects of emotional regulation and competitive sports.

Methods

This article adopted a systematic literature review as its research method, aiming to localize and summarize the evidence found on the theme [19]. The study's guiding question was developed based on a scope search in the literature [20], to locate studies on the theme. Thus, the question adopted was: What is the relationship between emotion regulation and sporting and competitive performance?

The review studies included in the systematic review were screened using Software EndNote X8®, which allows information management and the detection of duplicate studies in a safe and applicable way [21]. The eligibility criteria were established by employing a form, which extracted data from the studies herein included. The authors developed the form themselves and used it to identify the studies addressed in this systematic review After performing the scope searches and defining the guiding question, it was time to register in the PROSPERO platform under ID CRD42020216250.

Procedures

The guiding question was developed based on the SPIDER strategy [22] corresponds to the acronym S=sample, PI=phenomenon of interest, D=Design, E=evaluation, and R=Research type. This is the strategy that best relates to sports psychology studies [22] thus, the SPIDER strategy items and the description of the acronyms.

Defining the Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were defined based on the relevance and adequacy of the research theme and related to the SPIDER [22]. Studies that contemplate athletes in their sample (S) were included, as were studies that related emotion regulation to sporting performance and competitive performance as their phenomenon of interest (PI). The study design (D) was performed comprehensively. The studies adopted the items sporting performance and competitive performance as their evaluation (E). Qualitative, quantitative, and mixed method research (R) were considered. Therefore, the inclusion criteria were:

A. Studies that addressed Olympic and Paralympic sporting modalities and/or athletes in their samples.
B. Studies that addressed the influence of emotion regulation in athletic or competitive performance.
C. Studies that addressed both data collection and sample description in their scope.
D. Studies that described the instruments and procedures used in their scope.

The exclusion criteria encompassed studies relating emotion regulation and athletes who were recovering from injuries. Studies verifying the efficacy of intervention programs aiming at emotion regulation were also excluded since the scope of this review was the process of emotion regulation performed by the athletes themselves. Thus, the exclusion criteria of this systematic review consisted in:

A. Studies that addressed injuries, pain, rehabilitation, or pathologies.
B. Review studies.
C. Studies that addressed the efficacy of intervention programs aiming at emotion regulation.
D. Studies that addressed intervention programs aiming at increasing emotion regulation and sporting performance.

Database definition and choice of keywords

The searches were performed on electronic databases and the keywords were related to the SPIDER strategy. The keywords were used according to the respective restricted vocabulary of each database and, for bases that lacked their own vocabulary, Health Sciences (DeCS) descriptors were applied. This resulted in searches in the following databases: PubMed/Medline (Mesh Term); SciElo (DeCS); Portal BVS (DeCS); SPORTDiscus (Thesaurus); PsycNET (Thesaurus).

Database searches

The searches were performed until 15/03/2024, without limiting the publication period. Because English and Spanish are the languages with the greater number of publications, and Portuguese is the native language of the authors, publications in all three languages were considered. The database searches were performed using the search strategy of each database, using the acronym SPIDER to balance the sensibility and specificity of the study. The Boolean operators AND, OR were used, excluding the use of Boolean operator NOT, since the terms that could be excluded were not defined. As a result, the database search strategy used in this review is listed in (table 1).

Table 1. Search strategies in databases**.**

PUBMED/MEDLINE			
Items SPIDER: S; PI;E	Language English	Word: Mesh Terms	Total of studies: 57
((("Sports" OR "Sport Atletics" OR "Athletic" OR "Athletes" OR "Athlete")) AND (("Emotional Regulation" OR "Regulation, Emotional" OR "Emotion Self- Regulation" OR "Emotion Self-Regulation" OR "Self-Regulation, Emotion" OR "Self-Regulations, Emotion" OR "Emotional Self-Regulation" OR "Emotional Self-Regulation" OR "Emotional Self-Regulations" OR "Self-Regulation, Emotional" OR "Self-Regulations, Emotional" OR "Emotion Regulation" OR "Regulation, Emotion"))) AND (("Athletic Performance" OR "Athletic Performances" OR "Performance, Athletic" OR "Performances, Athletic" OR "Sports Performance" OR ("Performance, Sports" OR "Performances, Sports"))			
PORTAL BVS			
Items SPIDER: S; PI; E.	Language : English	Word: DeCS	Total of studies: 23
tw:((tw:((sports OR sports athletics OR athletic OR athletes OR athlete))) AND (tw:((emotional regulation OR emotional regulations or))) AND (tw:((athletic performance OR athletic performances OR performance, athletic OR performances, athletic OR sports performance))))			
			Results by base: MEDLINE (22)
Items SPIDER: S; PI	Language : Spanish	Word: DeCS	Total of studies: 4
tw:((tw:((deportes OR atletas))) AND (tw:((regulación emocional))))			
			Results by base: IBCS (4)
Items SPIDER: S; PI	Language : Portuguese	Word: DeCS	Total of studies: 15
tw:((tw:((atividades esportivas OR desportes OR desportos))) AND (tw:((regulação emocional))))			
			Results by base: LILACS (9) BDENF(3) Idex Psicologia (1)
SCIELO			
Items SPIDER: S; PI	Language : English	Word DeCS	Total of studies: 451
(sports) OR (sport athletics) OR (athletes) OR (Athletic) OR (Athlete) AND (Emotion Regulation) OR (Emotional Regulations)			
Items SPIDER: S; PI	Language : Espanhol	Word: DeCS	Total of studies: 1
((Deportes) OR (Atletas) AND (Regulación Emocional))			
Items SPIDER: S; PI	Language : Portuguese	Word: DeCS	Total of studies: 2
(Esportes) OR (Atletas) AND (Regulação Emocional)			
SPORTDISCUS			
Items SPIDER: S; PI; E	Language : English	Word: Thesaurus	Total of studies: 62
((“sports” OR “elite athletes” OR “sports competitions” OR “athletic ability” OR “athletics college athletes”)) AND ((“emotion regulation “OR emotions OR “self-control”)) AND ((“athletic performance OR “performance”))			
PSYCNET			
Items SPIDER: S;PI;E	Language : English	Word: Thesaurus	Total of studies: 396

Note:(Any Field: Athletes OR Any Field: Athletic OR Any Field: participation Athletic) AND (Any Field: Emotional Regulation OR Any Field: Emotional control OR Any Field: Emotional processing OR Any Field: Self-control Self-regulation OR Any Field: Socioemotional functioning) AND (Any Field: Sport Performance OR Any Field: Athletic performance)
Source: authors

Study screening

The articles identified in each of the databases were exported to the reference managing software EndNote® 8. The included studies were identified in two steps [20]. The first step included reading the summary titles and applying the inclusion criteria. The second step of the screening process consisted in reading the articles that were partially included in full, to then apply the inclusion and exclusion criteria. Finally, searches were performed in the references of studies that were definitively included.

Results

The search results totaled 1,013 studies, as follows: Pubmed (57), Portal BVS (42), SciElo (451), SportDiscus (62), PsycNET (396), and references of the articles (5). This process is described in the flow chart (Figure 1) Proposed by PRISMA [23].

After completing the database searches and the screening, 10 studies were included for qualitative analysis and synthesis. Three continents, Europe, Asia, and South America resulted from the search. There were seven European studies, two Asian studies, and one South American study.

The sample data of the studies totaled 434 athletes, with 365 or 84.1% of the male gender and 69 or 15.9% of the female gender, and a mean age of 25.8±6,4 among them. Eleven sports were investigated, among them were seven individual sports (archery, table tennis, athletics, swimming, rowing, golf, cycling), and four group sports (basketball, hockey, handball, and soccer).

The instruments used to identify emotion regulation strategies and the outcomes in sporting performance varied according to the sport, revealing six psychometric instruments: semi-structured interviews, recordings, physiological analysis, and brain activation.

The data described are presented in chart 1, comprised of the following: authors, journal, the location where the study was conducted, study objective, participants, age in years, investigated modalities, and instruments used. The analytical results are described in chart 2, which includes the results and conclusions of the studies.

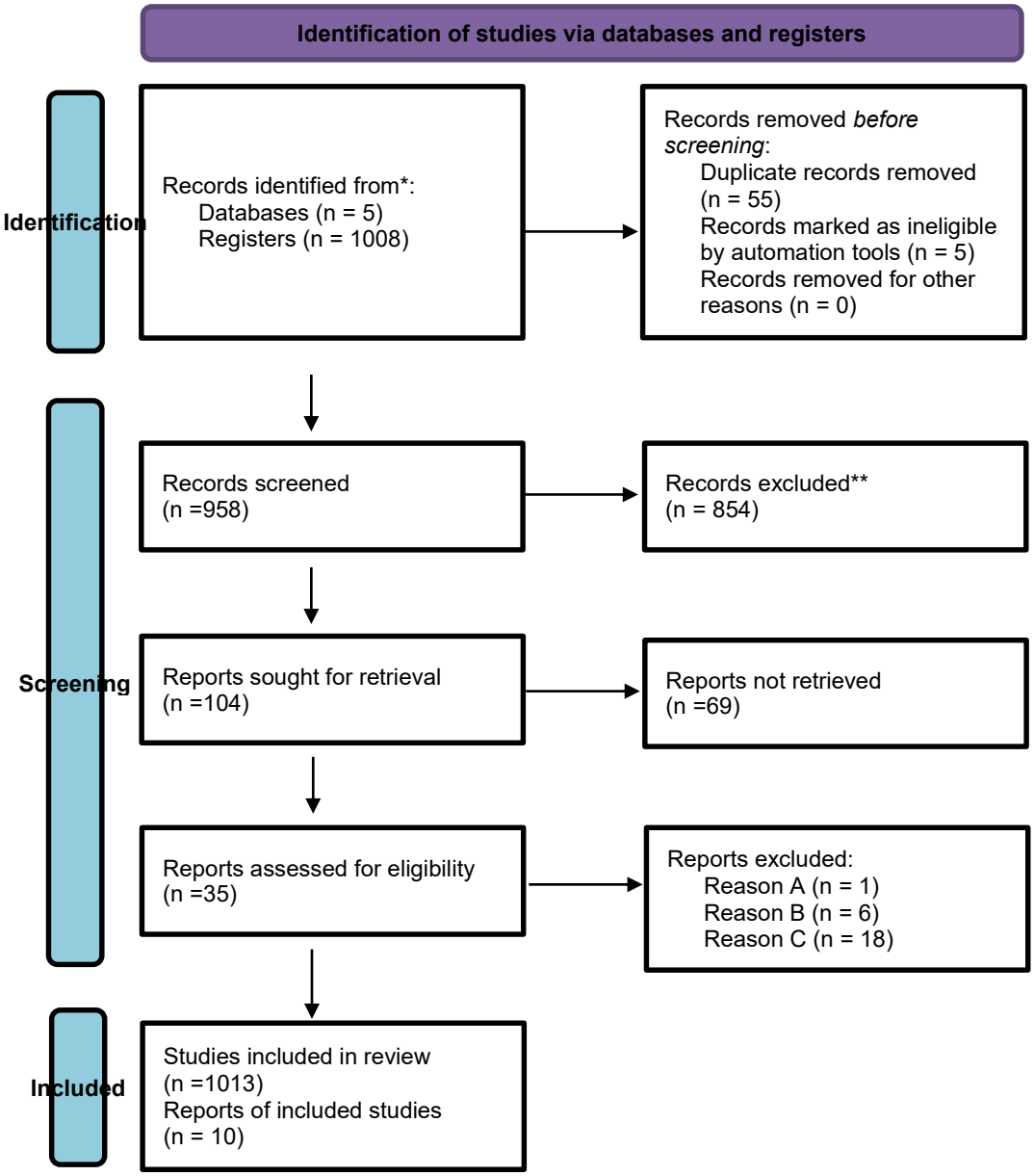

Figure 1. Systematic Review Flowchart
Note: Exclusion criteria: A) Studies addressing injuries, pain, rehabilitation and pathologies B) Review Studies C) Studies that addressed the intervention effectiveness of programs to increase emotion regulation.
Source: authors.

Quality assessment of included studies

The Joanna Briggs Institute (JBI) critical assessment verification tools were used to assess the risk of bias in all included studies [24]. The responses of the tools could be "yes", "no", "not clear", and "not applicable". Two reviewers (FR and GJ) independently assessed the risk of bias, and the same process used in the previous steps was followed to resolve any differences between the reviewers.

Table 2 Assesment of risk of bias of the cross-sectional studies

Study	1	2	3	4	5	6	7	8	Total score	Risk of bias
Beedie et al.[25]	Y	Y	Y	Y	N	NA	Y	Y	6	Moderate
Granado et al.[26]	Y	Y	Y	Y	N	NA	Y	Y	6	Moderate
Wagstaff[27]	Y	Y	Y	Y	Y	Y	Y	Y	8	Moderate
Chen et al.[28]	Y	Y	Y	Y	N	NA	Y	Y	6	Moderate
Kubiak et al.[29]	Y	Y	Y	Y	Y	NC	Y	Y	7	Moderate

Note: 1=Were the criteria for inclusion in the sample clearly defned? 2=Were the study subjects and the setting described in detail? 3=Was the exposure measured in a valid and reliable way? 4=Were objective, standard criteria used for measurement of the condition? 5=Were confounding factors identifed? 6=Were strategies to deal with confounding factors stated?; 7=Were the outcomes measured in a valid and reliable way? 8=Was appropriate statistical analysis used?; N: No; Y: Yes; NC: Not clear; NA: Not applicable.
Source: authors.

As can be seen in Table 2, the five studies reported with an analytical cross-sectional research design had well-defined inclusion criteria in explaining their samples, as well as the characteristics of the study subjects and the research environment. It is important to detail and precisely document these formal aspects of participants so that studies with similar objectives can be replicated and contribute to knowledge on a certain topic in a specific population. Additionally, the instruments were measured validly and reliably, specifying their psychometric properties and validations in the research context if required. On the other hand, 60% of cross-sectional studies did not identify confounding factors in their research. This means that the majority did not identify exposure variables that could have caused differentiation in the participants evaluated with the instruments. Thus, it is logical that these three studies did not establish strategies to address confounding factors. Finally, the results of all articles were measured validly and reliably considering the use of the instruments in different contexts. In addition, the appropriate statistics were used according to the research objectives, facilitating a thorough analysis of the results.

Table 3 Assesment of risk of bias of the case control studies

Study	1	2	3	4	5	6	7	8	9	10	Total score	Risk of bias
Robazza et al.[15]	N	N	Y	Y	N	N	NA	Y	NC	Y	5	Moderate
Robazza et al.[30]	NA	NA	NA	Y	NA	NA	NA	Y	N	Y	3	High

Note: 1: Were the groups comparable other than the presence of disease in cases or the absence of disease in controls?; 2: Were cases and controls matched appropriately?; 3: Were the same criteria used for identification of cases and controls?; 4: Was exposure measured in a standard, valid and reliable way?; 5: Was exposure measured in the same way for cases and controls?; 6: Were confounding factors identified?; 7: Were strategies to deal with confounding factors stated?; 8: Were outcomes assessed in a standard, valid and reliable way for cases and controls?; 9: Was the exposure period of interest long enough to be meaningful?; 10: Was appropriate statistical analysis used?; N: No; Y: Yes; NC: Not clear; NA: Not applicable.
Source: authors.

In the case-control design studies discussed, most bias assessment criteria were not applicable due to certain limitations. In one article, with only one participant, no differentiation between control and experimental groups existed for comparison. However, valid and reliable instruments, based on the IZOF model, facilitated thorough analysis. In another article, although both control and experimental groups were present, one participant was randomly selected outside the intervention. This led to uneven measurement of exposure between groups. Additionally, confounding factors were not identified or addressed in the cross-sectional studies, further highlighting potential biases.

Table 4. Assesment of risk of bias of quasi-experimental studies

Study	1	2	3	4	5	6	7	8	9	Total score	Risk of bias
Lane et al. [17]	Y	NA	N	N	NC	Y	NA	Y	Y	5	Moderate
Roy et Suwarganda[31]	Y	NA	N	N	N	N	NA	Y	Y	4	Moderate

Note: 1: Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?; 2: Were the participants included in any comparisons similar?; 3: Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?; 4: Was there a control group?; 5: Were there multiple measurements of the outcome both pre and post the intervention/exposure?; 6: Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?; 7: Were the outcomes of participants included in any comparisons measured in the same way?; 8: Were outcomes measured in a reliable way?; 9: Was appropriate statistical analysis used?; N: No; Y: Yes; NC: Not clear; NA: Not applicable.
Source: authors.

In Table 4, is very similar results regarding bias assessment criteria have been found in the quasi-experimental articles. Firstly, it is clear what the main variable of the study is, understanding which is the "cause" variable and which is the "effect" variable. However, a criterion that was not fulfilled and had repercussions on others is that all participants in the study were part of the intervention program, so there was no comparison between any control and experimental groups. It is likely that there was no control group because the authors, knowing that their intervention program could improve psychological skills such as emotional regulation, did not want any athlete to be left isolated without the benefit of potentially performing better in their sport, especially considering that they are constantly competing. Lastly, as we have observed in all the other articles, the instruments and statistics used are appropriate given their validity and reliability indices.

Table 5 Assesment of risk of bias of qualitative research

Study	1	2	3	4	5	6	7	8	9	10	Total score	Risk of bias
Martinent et al.[14]	Y	Y	Y	Y	Y	Y	NC	Y	Y	Y	9	Low

Note: 1: Is there congruity between the stated philosophical perspective and the research methodology?; 2: Is there congruity between the research methodology and the research question or objectives?; 3: Is there congruity between the research methodology and the methods used to collect data?; 4: Is there congruity between the research methodology and the representation and analysis of data?; 5: Is there congruity between the research methodology and the interpretation of results?; 6: Is there a statement locating the researcher culturally or theoretically?; 7: Is the influence of the researcher on the research, and vice- versa, addressed?; 8: Are participants, and their voices, adequately represented?; 9: Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?; 10: Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?; N: No; Y: Yes; NC: Not clear; NA: Not applicable

The selected qualitative article meets all the respective evaluation criteria except for the analysis of a possible influence of the researcher in the study's development, as indicated in Table 5. From the analysis of the results, it couldn't be precisely determined whether there is any influence. However, the other criteria regarding the congruence of the declared philosophical perspective and the other sections of the study were found to be adequate: research methodology, research question and objectives, methods used for data collection, data analysis, and interpretation of results. Additionally, based on the chosen model to explain the variable, it is easy for the reader to locate themselves theoretically. Finally, in the analysis of the results, there are excerpts from some participants' testimonies that help explain the conclusions found.

Chart 1. Descriptive Data

Authors	Journal	Country of the first author	Study objective	Participants (Athletes)	Age in years (Mean and Standard Deviation)	Sporting Modalities	Instruments Used
Martinent et al. [14]	Sport, Exercise, and Performance Psychology	France	To identify the type and effectiveness of emotion regulation and strategies used by table tennis players to manage their emotions during competition.	11 ♂	23.82±5.74	Table Tennis	Continuous recordings of the matches, (players' actions, score, referee). Self-confrontation interviews.
Robazza et al. [15]	Psychology of Sport and Exercise	Italy	To examine the effects of emotional self-regulation strategies based on the IZOF model	8 ♂	22±5.09	Soccer, hockey	Semi-Structured Interviews, Idiographic Assessments on Individualized Competitive Scales.
Lane et al. [17]	European Journal of Sport Science	United Kingdom	To investigate the effects of emotion regulation strategies and self-reported emotions in the 1600m race	8 ♂, 7 ♀	27.41±8.44	Athletics	Profile of Mood States-Adolescents (POMS-A).
Beedie et al. [25]	Applied Psychophysiology and Biofeedback	United Kingdom	To examine the interactions, feedback and emotion regulation, and physiological aspects in cycling athletes	7 ♂	34.14±7.40	Cycling	Profile of Mood States-Adolescents (POMS-A) Physiological and Performatic Analysis: Power, Time, Heart Rate, Blood Lactate, Blood Glucose, Ventilation. emotion regulation: Effort to regulate emotions and confidence to regulate emotions.
Granado et al. [26]	Cuadernos de Psicología del Deporte	Chile	To analyze which emotions are perceived in unfavorable results and which forms of emotion	61 ♂ 51 ♀	25.05± 8.59	Basketball, Hockey, Handball, Football	Semi-structured interview Emotion Regulation Questionnaire (ERQ).

			regulation can be found in team sports.				
Wagstaff[27]	Journal of Sport and Exercise Psychology,	England	To examine the relationship between emotion regulation and sporting performance.	10 ♂ 10 ♀	21,13± 1,61	Athletics, Swimming, Rowing	Brief Mood Introspection Scale Stroop Test, PSE, 8 Alternate questions. Heart Rate, Blood Glucose, and Vo^2_{Max} Peak.
Chen et al. [28]	PeerJ	Taiwan	To investigate emotional and motivational regulation as measured by the frontal alpha asymmetry in skilled golfers during placement performance after a performance failure.	16 ♂, 4 ♀	20.33±2.54	Golf	Frontal alpha asymmetry.
Kubiak et al.[29]	Journal of Personality	Germany	To verify the influence of emotion regulation and sports performance.	240 ♂	39.07±15.99	Table Tennis	Cognitive Emotion Regulation Questionnaire (CERQ) and Emotion Regulation Questionnaire (ERQ).
Robazza et Suwarganda[30]	Journal of Sport Behavior	Italy	To test predictions derived from the Individual Zones of Optimal Functioning (IZOF) model that comprises facilitating and inhibiting emotions	1 ♀	22	Archery	Idiographic Assessments on Individualized Scales Competitive and State Anxiety Inventory-2 Heart rate.
Roy et Suwarganda[31]	International Journal of Psychological Studies	Malaysia	Identify the effect of emotion regulation on archery scores.	4 ♂	23 ± 2.3	Archery	Modified Borg's intensity scale.

Source: authors.

Chart 2. Analytical data.

Authors	Results	Conclusion
Martinent et al. [14]	The competition revealed ten emotions: anger, anxiety, discouragement, disappointment, disgust, joy, serenity, relief, hope, and pride. Four categories of emotion regulation were revealed: understood effort regulation, automatic regulation, no regulation, and regulation effectiveness.	Athletes that evaluated their regulations as effective performed well and athletes who rated their emotions as being negative performed poorly.
Robazza et al. [15]	Facilitator-inhibitor and pleasant-unpleasant emotions and their implications on bodily symptoms were found, therefore improving sporting performance.	The IZOF model suggests the optimal activation for sports performance. Emotion regulation is important for sporting performance. However, to identify ideal activity zones for each athlete and sport, there is still the need for more research, with new applications of the IZOF method, in addition to training.
Lane et al. [17]	The results point towards an ideal emotional state for performance, comprised of feeling happy, calm, energetic, and moderately anxious, whereas the worst emotional state for performance involves feeling discouraged, slow, and very anxious. When increased, negative emotions did not reflect a significant difference in the 1600m running time, but when decreased, unpleasant emotions reflected shorter times in the first 400m.	Athletes can represent inventions to shift negative and positive emotions. Therefore, a suggestion is made that new studies be developed to address the optimal performance of positive and negative emotions.
Beedie et al. [25]	Positive feedback was associated with lower oxygen consumption, higher glucose, happiness, calmness, lower levels of anxiety and melancholy, and less effort for emotion regulation.	Negative feedback influenced emotional and physiological responses, but not the athletes' performance. These findings, however, can guide further investigations in other sports.
Granado et al. [26]	Following the Cross 2015 model on emotion regulation, the results point to a connection between the type of emotion perceived in negative outcomes and using a change in strategy as a type of emotion regulation.	In adverse outcomes, positive cognitive change and the experience of sharing positive emotions with teammates and the coach are more functional for positive performance.
Wagstaff[27]	The results suggest that the impairment of emotional self-regulation resources affects perceived exertion, rhythm, and sports performance in endurance sports. As for the physiological variables, negative emotions presented lower HR and there was no difference in blood glucose in situations involving negative emotions.	How negative emotions are perceived can affect performance in endurance sports. Thus, regulating these emotions can be fundamental for sports yield.
Chen et al. [28]	Two outcomes were found, with the first being related to positive performance on greater T2 frontal alpha asymmetry compared to T1, and the second regarding frontal asymmetry being related to negative performance.	Emotional and motivational regulation was associated with better performance and a progressive increase in frontal asymmetry.
Kubiak et al. [29]	Using the model proposed by Cross 2015 on emotion regulation, positive cognitive change was associated with positive outcomes and negative cognitive change was	Some emotion regulations were not effective for performance. Forms of emotion regulation can change throughout the season and

	associated with negative outcomes. Furthermore, high-performance athletes also showed positive cognitive change, situation shift, and strategy modulation.	vary according to the importance of the competition, as well as sporting performance.
Robazza et al.[30]	The results indicated negative emotions before the competition, in addition to changes in heart rate during competition.	The results were supported by poor athlete performance and these findings, in turn, support the IZOF model on emotion regulation in an optimal activation pattern.
Roy et Suwarganda[31]	Following Hanin's 1997 categorization of emotions. Results revealed that unpleasant dysfunctional emotions (N-) had the greatest influence on the performance score of archery athletes.	Athletes must be aware of aspects that can interfere with their performance, especially ways to control emotions when under pressure.

Source: authors.

Discussion

The study aimed to perform a systematic review on the relationship between emotion regulation and sporting performance. Emotion regulation is connected to adaptive processes and human survival, and an individual's interaction with their environment [7].

Several emotions emerge during the athlete's interaction with the sports environment [31], who found the connection between emotions and their impact on sports, considering that emotions can trigger physiological and psychological shifts such as a change in heart rate, sweating, coordinative changes, anxiety and cognitive changes [32].

That said, the athletes' awareness of their emotions and how much they can emerge during the performance, plus mechanisms to regulate them are fundamental for sporting performance [6, 31, 33]. Whereas the ability to perceive emotions is associated with concentration, sources of stress, and physiological changes [34, 35].

Regulating negative emotions is connected to sporting performance [14], who studied table tennis athletes and observed the influence of negative emotions on their performance. In other sports, however, such as soccer[35], it was revealed that positive and negative emotions are related to a set of psychosocial factors, such as social relationships, competitive aspects, physical, social and cultural factors. Along this same line of thought[36], report that emotions that arise during sports can be associated with teammate relationships, criticism, and the social context itself.

It was found that emotions can change heart rate, salivary cortisol, Vo^2MAX, and brain activation and that these changes are linked to positive and negative emotions in sports [28, 30].

This occurs due to the interaction with environmental factors, such as fans, titles, and familiarization with the sport, and psychological factors such as stress, anxiety, and motivation [35, 37], the athlete's analysis of the situation can trigger several mechanisms that corroborate the physiological changes (e.g. adrenaline) which are secreted by the adrenal [25].

Regarding emotion regulation and sports performance, it was shown that emotions can have repercussions in group and individual sports, and several characteristics such as precision, speed, and resistance. These findings suggest that, regardless of the specificity of the sport, the type and intensity of emotions can negatively or positively affect sports performance. Furthermore[30, 38], mention that emotions can occur at different times, such as pre- and post-competition, for example, which means that strategies such as pep talks, mental training, and emotional control that aim at managing emotions and preventing a hindered performance can be important strategies to adopt.

This systematic review verified the predominance of male athletes over emotion regulation (84.1%), showing a limitation on the relationship between emotion regulation and sports performance given that female athletes can present other social and psychological characteristics, not to mention sports that are specific to the female gender, such as artistic gymnastics.

Emotion regulation can also be related to other psychological constructs, such as coping and resilience, as pointed [39, 40].

also report the importance of a motivational environment, created by the coach, in athletes' emotions. However, despite evidence on the relationship between emotion regulation and other psychological constructs, this relationship was not observed in the studies herein analyzed.

Two lines of theoretical references were revealed among the studies included in this review. One emerges from studies [16] on the IZOF model, which assumes that emotions are a psychobiosocial, multimodal and dynamic component, with the full manifestation of human functioning. This model provides a framework for describing, predicting, explaining, and allowing control of positive and negative emotions related to individual performance [15]. The

second line of thought can be observed from the proposal [18] who suggests that emotion regulation is influenced by five components: (a) situation selection (b), situation modification (c) attention splitting (d) cognition changes (e) response modulation.

However, no studies where the two models interacted were found, but it is worth mentioning that both models should be considered since, as emphasized [13], emotion regulation and understanding this skill in sporting performance is of great importance.

Final considerations

In short, new research on the subject and its impact on sporting performance that can verify emotion regulation together with other psychological factors such as motivation, motivational environment, and mental robustness in a longitudinal and temporal perspective are important. Also, the results of this systematic review increase understanding of the importance of motion regulation and highlight its relationship with sports performance.

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